



CONSERVATION ENHANCEMENT ACTIVITY

E590A

CONSERVATION STEWARDSHIP PROGRAM

Improving nutrient uptake efficiency and reducing risk of nutrient losses

Conservation Practice 590: NUTRIENT Management

APPLICABLE LAND USE: Crop (annual & mixed); Crop (perennial)

RESOURCE CONCERNS: Water, Air

ENHANCEMENT LIFE SPAN: 1 year

Enhancement Description

Nutrient management encompasses managing the amount, source, placement, and timing of the application of plant nutrients and soil amendments. Nutrients are currently being applied on the farm based on the 4R nutrient stewardship principles. Enhanced nutrient use efficiency strategies or technologies are utilized to improve nutrient use efficiency and reduce risk of nutrient losses to surface and groundwater and reduce risks to air quality by reducing emissions of greenhouse gases (GHGs).

Criteria

- Documentation of producer's record of nutrient management meeting all NRCS Conservation Practice Standard Nutrient Management (CPS 590) general criteria and additional criteria to minimize agricultural nonpoint source pollution of surface and groundwater.
- For Nitrogen, Phosphorus, and Potassium (N-P-K), rates of application are to be agronomic application rate (based on soil test and yield goal).
- Minimize soil surface disturbance during nutrient placement.
- **Utilize two or more nutrient use efficiency strategies or technologies** to reduce nutrient loss risk and improve nutrient use efficiency. Select two or more of the strategies and technologies below:

E590A - Improving nutrient uptake efficiency and reducing risk of nutrient losses	August 2019 1	Page
---	------------------	------



CONSERVATION STEWARDSHIP PROGRAM

- Use Enhanced Efficiency Fertilizer (EEF) products with 1 or more nutrient applications.
 - Nitrogen or phosphorous EEF products recommended by state Land Grant University (LGU) and concurred with by NRCS on all treatment acres to supply at least 50% of the pre-emergent and early post emergent LGU recommended nitrogen or phosphorous requirements for the crop(s) grown.
- Use in-season soil nitrate sampling.
 - Use pre-sidedress soil nitrate test (PSNT) to determine the need and/or amount of additional nitrogen to be applied during sidedress/topdress N application. Conduct a PSNT on a selected crop (e.g. corn) to test if additional N fertilizer is needed.
- Use in-season plant tissue sampling and analysis as a complement to soil testing.
 - Follow local LGU and/or laboratory guidelines for interpretations of the results and appropriate adjustments in the application of N and other nutrients. *End of season stalk nitrate testing is not applicable if the enhancement is only contracted for one year, as results must be used to evaluate and adjust nutrient management in the following year, as needed.*
- Split nutrient applications.
 - Apply no more than 50% of total crop nitrogen needs within 30 days prior to planting (or in the case of hay or pasture after green up of dormant grasses). Apply the remaining nitrogen after crop emergence (or green up).
 - Post emergent nitrogen may be reduced based on crop scouting, in-season soil sampling/analysis, or plant tissue sampling/analysis.
- Time nutrient application timing to match nutrient uptake timing.
 - Apply nutrients no more than 30 days prior to planting date of annual crops.
- Nutrient placement below soil surface.
 - Nutrients are injected or incorporated at time of application.
- Use of nitrification inhibitors to delay the nitrification process, by eliminating the bacteria *Nitrosomonas* in the area where ammonium is to be present.



CONSERVATION STEWARDSHIP PROGRAM

- Materials must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.
 - Application timing, method, N source, soil texture, and tillage regime are all factors that should be evaluated to determine where nitrification inhibitors should be used. Before buying an inhibitor make sure scientific evidence backs up all claims. Producers and/or consultants should be wary of any product that does not have solid scientific data demonstrating that the inhibitor activity matches the advertised benefit.
- Use of urease inhibitors to temporarily reduce the activity of the urease enzyme and slow the rate at which urea is hydrolyzed.
- Materials must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.
 - Application timing, method, N source, soil texture, and tillage regime are all factors that should be evaluated to determine where urease inhibitors should be used. Before buying an inhibitor make sure scientific evidence backs up all claims. Producers and/or consultants should be wary of any product that does not have solid scientific data demonstrating that the inhibitor activity matches the advertised benefit.



CONSERVATION STEWARDSHIP PROGRAM

Documentation and Implementation Requirements

Participant will:

- ☐ Prior to implementation, provide documentation for review by NRCS showing a record of implementing nutrient management meeting all applicable NRCS Conservation Practice Standard Nutrient Management (CPS 590) general criteria and additional criteria to minimize agricultural nonpoint source pollution of surface and groundwater.
- ☐ Prior to implementation, develop and document a planned nutrient budget, yield goal, and applications (pounds/acre active ingredient, nutrients must include at a minimum N-P-K).
- ☐ Prior to implementation, select two or more of the nutrient use efficiency strategies or technologies. **Selections:** _____
- ☐ During implementation, keep records to document actual nutrient applications (pounds/acre active ingredient, nutrients must include at a minimum N-P-K).
- ☐ During implementation, minimize soil surface disturbance during nutrient placement.
- ☐ During implementation, notify NRCS of any planned changes to verify the planned system meets the enhancement criteria.
- ☐ During implementation, additional record keeping requirements for specific strategy or technology:
 - In-season soil nitrate sampling. Records and documentation must include results (including reference strips) and adjustments in nutrient management based on results.
 - In-season plant tissue sampling and analysis. Records and documentation must include type of test used (stalk, leaf, chlorophyll, infrared, or other plant tissue), results (including reference strips), and adjustments in nutrient management based on results.
 - Nutrient placement below soil surface. Records and documentation must include method of injection or incorporation and depth.
- ☐ After implementation, make documentation and records available for review by NRCS to verify implementation of the enhancement.



CONSERVATION STEWARDSHIP PROGRAM

NRCS will:

- ☐ As needed, provide technical assistance to meet the criteria of the enhancement.
- ☐ Prior to implementation, provide and explain NRCS Conservation Practice Standard Nutrient Management (CPS 590) as it relates to implementing this enhancement.
- ☐ Prior to implementation, review documentation to verify a record of implementing nutrient management meeting all NRCS Conservation Practice Standard Nutrient Management (CPS 590) general criteria and additional criteria to minimize agricultural nonpoint source pollution of surface and groundwater.
- ☐ Prior to implementation, verify the development of a planned nutrient budget, yield goal, and planned nutrient applications.
- ☐ Prior to implementation, verify the selection of two or more nutrient use efficiency strategies or technologies.
- ☐ During implementation, evaluate any planned changes to verify the planned system meets the enhancement criteria.
- ☐ After implementation, review documentation and records to verify implementation of the enhancement.

NRCS Documentation Review:

I have reviewed all required participant documentation and have determined the participant has implemented the enhancement and met all criteria and requirements.

Participant Name _____ Contract Number _____

Total Amount Applied _____ Fiscal Year Completed _____

NRCS Technical Adequacy Signature

Date



INDIANA SUPPLEMENT TO CONSERVATION ENHANCEMENT ACTIVITY

CONSERVATION STEWARDSHIP PROGRAM

E590A

Additional Criteria for INDIANA

Select **two or more** of the strategies or technologies from the list below to reduce nutrient loss risk and improve nutrient use efficiency:

- Use Enhanced Efficiency Fertilizer products with 1 or more nutrient applications on all treatment acres to supply at least 50% of the pre-emergent and early post emergent LGU recommended nitrogen requirements for the corn crop.

Applies only to slow-release or controlled-release formulations of nitrogen fertilizer including products with coatings such as sulfur and/or polymer/plastic and synthetic organic compounds, such as but not limited to:

- Sulfur or polymer coated urea.
- Other products could meet this definition. Contact the NRCS State Office for confirmation of additional active ingredients or products.

Note: It is recommended that coated urea products be used for pre-plant applications only. Preliminary data suggests that in-season applications to corn may not release nitrogen in time for crop uptake risking yield reduction and left over nitrogen at the end of the season. Avoid surface application on sloping ground where risk of product to floating/washing to lower ground and off field or to tile inlets/risers in heavy spring rains is high.

There is no implied endorsement of any product(s) made or intended.

Scenarios and instances that do not apply, such as but not limited to:

- There are no currently acceptable EEF phosphorus products.
- This does not apply to applications ahead of and for soybeans.
- The use of ammonium thiosulfate is not eligible for this enhancement.
- Foliar nitrogen fertilizers are not eligible for this enhancement.



CONSERVATION STEWARDSHIP PROGRAM

- Use in-season pre-sidedress soil nitrate test (PSNT) to determine the need and/or amount of additional nitrogen to be applied during N sidedress application for the corn crop.
 - PSNT only applies to fields that are regularly manured and/or growing a perennial legume.
 - The PSNT soil test shall be sent to an ACP Certified Soil Testing Laboratory. A list of laboratories can be found at:
<http://urbanext.illinois.edu/soiltest/>
 - For additional information on how to conduct the pre-sidedress soil nitrate test (PSNT) and how to interpret the results refer to:
Purdue University publication - *The Pre-sidedress Soil Nitrate Test for Improving N Management in Corn* (AY-314-W)
<https://www.extension.purdue.edu/extmedia/AY/AY-314-W.pdf>
- Use in-season plant tissue sampling and analysis for nitrogen (corn only) as a complement to soil testing.
 - Current soil test must not be older than 4 years old.
 - **For information (in its entirety) on how to conduct corn leaf tissue testing (chlorophyll meter) and how to interpret the results refer to:**
 - *Determining Nitrogen Fertilizer Sidedress Application Needs in Corn Using a Chlorophyll Meter* (AY-317-W)
<https://www.extension.purdue.edu/extmedia/AY/AY-317-W.pdf>
 - According to the Purdue AY-317, the sampling protocol in general (this is not all inclusive) is:
Reference Strips:
 - Requires the use of already established reference strips.Sample Location:
 - Individual leaf measurements should be made on 30 different plants at each sampling location within a field.
 - The average greenness score should be used as the average SPAD reading for that location.
 - Refer to AY-317 for instructions on plant growth stage and leaf to sample.



CONSERVATION STEWARDSHIP PROGRAM

Acceptable in-field meters such as, but not limited to, include:

- SPAD Meter.
- Greenseeker Handheld Crop Sensor.
- Split nitrogen applications.
 - Apply no more than 50% of total crop nitrogen needs within 30 days prior to planting (or in the case of hay or pasture after green up of dormant grasses). Apply the remaining nitrogen after crop emergence (or green up).
 - Post-emergent nitrogen may be reduced based on crop scouting, in-season soil sampling/analysis, or plant tissue sampling/analysis.
 - Fall applications of anhydrous ammonia for a spring-seeded crop do not qualify as a pre-plant application.
 - Use of a urease or nitrification inhibitor or controlled-release fertilizer applied pre-plant or at planting does not replace split application of N after the crop is established.
- Apply nutrients (nitrogen and phosphorus) no more than 30 days prior to the planting of annual crops (such as corn and soybeans).
- Fertilizer (nitrogen and phosphorus) is injected or incorporated at time of application.
 - Injection (no-till and/or strip-till) may be needed to meet additional CSP requirements.
 - Incorporation may not meet additional CSP requirements.
- Use of nitrification and urease inhibitor materials as defined by the Association of American Plant Food Control Officials (AAPFCO) and accepted for use by Office of Indiana State Chemist. Use the minimum application concentration or rate of inhibitor that has been proven efficacious.

Nitrification Inhibitors:

- Nitrapyrin (active ingredient). Follow EPA label.
- Dicyandiamide (also called DCD) (active ingredient).
- Other active ingredients or products could meet this definition. Contact the NRCS State Office for confirmation of additional active ingredients or products.



CONSERVATION STEWARDSHIP PROGRAM

Urease Inhibitors:

- NBPT (active ingredient).
- NPPT (active ingredient).
- Other active ingredients or products could meet this definition. Contact the NRCS State Office for confirmation of additional active ingredients and/or products.

Products containing both a nitrification and urease inhibitors:

- DCD and NBPT (active ingredients).
- Other combinations of active ingredients or products could meet this definition. Contact the NRCS State Office for confirmation of additional active ingredients and/or products.

Ammonium thiosulfate is not eligible for this enhancement.

Nitrification inhibitors are most useful with pre-plant nitrogen application on sandy (excessively drained) soils prone to leaching or with fall nitrogen application on poorly drained soils subject to denitrification (Note: fall applied N, even with a nitrification inhibitor, is not eligible for this CSP Enhancement). Urease inhibitors may reduce volatilization of urea fertilizers surface applied to high residue or weakly buffered soils, and when a substantial rainfall or irrigation event is unlikely for several days after application. (Source: [Agricultural Nitrogen Management for Water Quality Management in the Midwest](#), revised 2013).

There is no implied endorsement of any product(s) made or intended.

Additional Documentation Requirements for INDIANA:

Notes and comments on this National Enhancement:

- Formerly E590118Z, E590119Z and E590130Z.